

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

72847
cap5

LIBRARY
ENT SERIAL RECORD

Lupines

NEW LEGUMES FOR THE SOUTH

FARMERS'
BULLETIN
No. 1946



U. S. DEPARTMENT OF AGRICULTURE

LUPINES

*A New Legume Crop
for the Southern States*

Advantages:

A valuable legume for winter cover crops and for green manure.

Does well on soils of low fertility.

Stands are easily obtained.

Produces abundant and easily harvested seed.

Requirements:

Inoculate seed at time of seeding.

Use superphosphate on soils of low fertility.

Seed only deep enough for contact with moisture.

Precautions:

Lupines contain an alkaloid poisonous to livestock.

Do not allow livestock in lupine fields when other feed is not available.

To avoid serious seed loss, harvest before plants are sufficiently ripe for shattering.



Lupines: New Legumes for the South

By ROLAND MCKEE, *senior agronomist, Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration*, and G. E. RITCHEY, *associate agronomist, Division of Forage Crops and Diseases, and agronomist, Florida Agricultural Experiment Station*

Contents

	Page		Page
Nature and use of the lupine plant.....	1	Seeding—Continued.	
Description.....	2	Time.....	6
Where adapted.....	2	Rate.....	6
Acreage.....	4	Method.....	7
Uses.....	4	Harvesting.....	7
The seed.....	4	Season.....	7
Characteristics.....	4	Green manure.....	7
Source of supply.....	4	Seed and yields.....	7
Soil requirements.....	6	Diseases.....	8
Fertilizer.....	6	Root knot.....	8
Lime.....	6	Other diseases.....	8
Seeding.....	6	Other information.....	9
Inoculation.....	6		

Nature and use of the lupine plant

LUPINES have been known since before the birth of Christ and for the past 200 years or more have been commonly used in central European countries for soil improvement and to some extent as feed for livestock. Of the many species recognized, the following annuals are the ones most used commercially: White lupine (*Lupinus albus*);

yellow lupine (*L. luteus*); and blue lupine (*L. angustifolius*). In New Zealand and Western Australia, lupines have been used satisfactorily during recent years as feed for sheep, although they contain an alkaloid that is poisonous to many animals and thus reduces profits.

In the United States several species have been planted experimentally in the past 50 years by a number of experiment stations, but with little success. Recent trial plantings in the Gulf coast area of the Southeastern States have given good results, and extensive commercial plantings, chiefly of blue lupine (fig. 1), are now well established in Florida, Georgia, Alabama, and Louisiana. Lupines make excellent winter growth and heavy seed yields and are valuable as a winter cover crop to conserve soil fertility and to supply the nitrogen so much needed in crop production.

Description

The plants are upright and have coarse stems and medium-sized digitate leaves. Field-crop species are annuals; some ornamentals are perennial. Blue and white lupines usually attain a height of 2 to 3 feet, yellow lupines 1 to 2 feet (fig. 2).

Where adapted

Lupines require cool weather for best development, and in the South commercial varieties must be grown as winter annuals. In the

Figure 1.—Blue lupines nearing full bloom in a large field planting.





Figure 2.—Single lupine plants—blue (left), yellow (center), and white (right)—showing general characteristics.

North they will have to be handled as summer annuals and seeded early in spring. Commercial plantings have succeeded in the United States in the Gulf coast area only. White lupine has done best on alluvial soil in the lower Mississippi Delta, and blue lupine on Coastal Plain soils farther east. Commercial plantings of yellow lupine have not been successful, although experimental plantings in

some instances have given good results. Some soils are known to be better suited for lupines than others, but much remains to be determined regarding limits in soil adaptation and whether the plants can be grown successfully in more northern latitudes.

Acreage

It is estimated that 1,000,000 acres of lupines are growing in Europe. Approximately 10,000 acres were planted in the United States in 1942, and about 1,000 acres were harvested for seed.

Uses

Lupines are used mostly for green manure. The upright habit of growth and the comparatively few plants required for a stand make lupines less suited for use in soil-erosion control than smaller and more matting types of plants.

Although immature plants of some species are eaten by livestock without harm, *a number of species are known to be poisonous*, both in the green and the dry state. The seed contains a higher percentage of poisonous alkaloids than any other part of the plant. Ordinarily livestock will not eat lupines containing poisonous alkaloids. The three species here mentioned normally have seed high in alkaloid.

Nonalkaloid strains have recently been developed in blue, white, and yellow lupines, but in the blue lupine these strains have not been fully stabilized. These alkaloid-free strains may extend the use of both fodder and seed of lupines as stock feed.

The seed

Characteristics

Seeds of all species, so far as known, retain their vitality under good storage conditions. White lupine has germinated 100 percent after 5 years and ordinarily has no hard seed, blue and yellow lupines often contain some hard seed. White lupine has about 900 seeds per pound and weighs about 55 pounds per bushel; blue lupine has about 2,500 seeds per pound and weighs about 60 pounds per bushel; yellow lupine has about 4,000 seeds per pound and weighs about 60 pounds per bushel.

Source of supply

Seed of most of the commercial species has been generally available from Europe. Some blue lupine seed has been grown in Florida, Georgia, and Alabama and in season is available in limited quantity through commercial seed firms.



Figure 3.—Root of lupine, showing characteristic nodules, which contain nitrogen taken from the air by the plant and deposited through the interaction of bacteria.

Soil requirements

Lupines differ in their adaptation to soils of different fertility levels. Yellow lupines do well on moderately acid light sandy soils of low fertility. Blue lupines require neutral or slightly acid soils of at least moderate fertility. White lupines need fertile neutral soils for satisfactory growth.

Fertilizer

The use of potash for lupines on sandy land has given negative results. Sodium nitrate has increased the yields but ordinarily it is not needed. Superphosphate has given good results, and 300 to 400 pounds per acre is recommended unless the previous crops in the rotation have been heavily fertilized, in which case small quantities or none may be needed. Superphosphate has injured stands when applied in direct contact with the seed.

Lime

On light sandy lands lime is considered detrimental to lupines or is not needed, but on heavier soils it may be beneficial.

Seeding

Inoculation

Inoculation of lupine seed is essential, and, so far as is known, it should be done every year. When the seed is well inoculated nodules are produced in great abundance (fig. 3). Commercial cultures are available and should be used at the time of seeding.

Time

In regions with mild winters (15° F. or above) seeding should be done from October 1 to December 1. Later plantings sometimes give good results. Blue and yellow lupines volunteer some plants but cannot be depended upon to volunteer a full stand. Seeding in northern latitudes should be made early in spring (April 1 to May 15).

Rate

Rates per acre to be recommended under average conditions when lupines are seeded in close drills or broadcast are as follows: White lupine, 160 pounds; blue lupine, 90 pounds; yellow lupine, 60 pounds.

At this rate of seeding and with drills 8 inches apart, the seed in the drills would be about $4\frac{1}{2}$, $3\frac{1}{2}$, and 3 inches apart for white, blue, and yellow lupine, respectively. With favorable weather conditions and a good seedbed, these rates can be decreased about one-fourth.

Method

Seed shallow, 1 or 2 inches deep, and firm the soil with a cultipacker or by other means to insure contact of the seed and moist soil. A grain drill can be used or the seed broadcast and covered by disking. Seedlings can be made in wide rows without reducing seed yields, and sometimes this may be desirable.

Harvesting

Season

In the Gulf coast area of the Southeastern States, fall seedings mature in May or early in June. In northern latitudes early spring seedings mature in August.

Green manure

In the South the comparatively large growth made by lupines during the winter months makes them an excellent crop for turning under for soil improvement. Where adapted, they make a heavier herbage yield than Austrian Winter field peas or hairy vetch and in this respect are superior to these crops. A 3-year average yield of more than 25,000 pounds green weight per acre by March 22 has been reported by the North Florida Agricultural Experiment Station, at Quincy, and is indicative of their high-producing ability.

A large taproot and its smaller lateral branches furnish an abundance of unusually large nodules that in turn supply nitrogen to the soil. This, together with the large quantity of organic matter that lupines supply and the fact that this is produced early, makes the plant a most desirable soil-improving crop to precede cotton and corn.

Seed and yields

Lupines can be harvested and handled with ordinary farm machinery. *They are not recommended for forage, however, because they might be poisonous to livestock.* If the nonalkaloid strains recently developed come into commercial production, the danger from poisoning can be eliminated. Under favorable conditions 1 to 3 tons of herbage per acre can be obtained with lupines.



Figure 4.—Harvesting blue lupine for seed with a combine in Florida.

Harvesting of the seed should be begun before the plants are quite mature, and when a mower is used the crop should be cut while dew is on the plants. In yellow lupine the seed shatters readily when allowed to mature, and in blue lupine moderate shattering occurs. White lupine retains its seed quite well. A combine can be used if the crop is mature. In threshing, use a combine or a thresher adapted to peas or beans. Mature seed flails easily, making it possible for growers of small acreages to save seed for home use without special threshing equipment. Most species produce seed abundantly. In Florida 1,200 pounds per acre frequently has been obtained from blue lupines (fig. 4).

Diseases

Root knot

Lupines are subject to root knot (nematode), but suffer less damage than peas and vetch.

Other diseases

Several fungus diseases attack lupines and sometimes do considerable damage. No definite control measures have been determined, but in Florida there has been less damage in the seedling stage from plantings made in November and December than from those made earlier. Selection for disease resistance is in progress.

Other information

In North America short statements on lupines are available in general reference books, and recently a bulletin¹ was published by the Florida State Agricultural Experiment Station. Many short articles have been published in European journals.

¹ WARNER, J. D. LUPINES, A SEED PRODUCING WINTER LEGUME. Fla. Agr. Expt. Sta. Press Bul. 341, 2 pp. 1939.

U. S. GOVERNMENT PRINTING OFFICE: 1943

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington, D. C. - Price 5 cents

